of the season, presented a supplementary report. Mr. Norman Taylor was appointed by the president chairman of the field committee for 1909.

The secretary reported that 15 regular meetings had been held during the year, at which 463 persons were present. Nine persons have been elected to membership but not all have qualified, and 14 resignations have been received and accepted. Through death the Club has lost three members.

The treasurer's report indicated that the Club's finances are in a satisfactory condition.

The following officers were elected for the year 1909:

President: Henry Hurd Rusby.

Vice-Presidents: Edward Sandford Burgess and John Hendley Barnhart.

Secretary: Percy Wilson.

Treasurer: William Mansfield.

Editor: Marshall Avery Howe.

Associate Editors: John Hendley Barnhart, Jean Broadhurst, Philip Dowell, Alexander W. Evans, Tracy Elliot Hazen, William Alphonso Murrill, Charles Louis Pollard, and Herbert Maule Richards.

The Club adjourned at 10:15 P. M.

PERCY WILSON,
Secretary

OF INTEREST TO TEACHERS

LABORATORY TEACHING

Professor Charles H. Shaw, discussing laboratory teaching for culture students in *Science* for September 11, states that the average student falls to a discouraging degree short of "developing that power of obtaining knowledge which it was planned that he should," and "as a matter of fact the hours when actual independent work is being done are few and precious, and the greater part of the laboratory time is spent in merely performing assigned tasks."

Professor Shaw further adds: "In looking for a solution my

point of departure would be the fact that *certain* of the lessons actually do call out a real interested and independent effort on the part of the student. That ounce of fact is worth tons of theorizing. Then if it is true that the greatest good which can come to the student out of such courses is the development of his own powers of obtaining knowledge, it would not seem far to this principle: *The laboratory course should be composed mainly of those lessons which the instructor can so present as to arouse independent effort on the part of the student.*

"Then the question will at once arise 'What about the lessons of which this is not true; what about the many and important topics in which the student can at best scarcely do more than to perform faithfully the task assigned?' My answer would be to remove most of them frankly to the domain of lecture and demonstration. A good demonstration, where the student feels the spark of inspiration from the teacher's performance and example, is far better for both teacher and student than a time-serving laboratory exercise.

"No doubt a certain proportion of laboratory lessons which are mere verification exercises are desirable, but on the whole it still remains true that for culture students *the laboratory hours are too precious to be used in anything but independence begetting work.* In the lecture room is the place to see that the course is rounded out, kept coherent, and the ground covered."

In a recent paper, Charles J. Brand, of the U. S. Bureau of Plant Industry, traces the history of alfalfa in the United States. The earliest date of introduction is 1855, from South America to California; the next, 1857, from Europe to Minnesota.

The South American seed finding a congenial soil and climate easily became the basis of an extensive industry now netting $150,000,000 a year. The European seed, despite the favorable soil in Minnesota, was acclimated with difficulty; but Grimm, the farmer who introduced it, worked with "characteristic German persistence, realizing neither the practical nor the scientific importance of his unconscious experiment in acclimatization." He

"patiently saved generation after generation of seeds from the plants that survived each successive winter, planting new fields to replace the deteriorated ones on his own farm, and selling his surplus seed to his neighbors. He was probably oblivious both to the difficulty of the task he had undertaken and to the great value of the result, and took as a matter of course the yearly degeneration of his stands," until now the Grimm strain is recognized as one of the hardiest; it "is undoubtedly the direct product of fifty-one years of perpetuation of fit and elimination of unfit individuals under climatic conditions whose rigors are unknown in Germany."

Robert Kennedy Duncan in his recent book, "The Chemistry of Commerce," has a chapter on cellulose which is written in a manner making it equally interesting to a scientist or to a novice in the field. He shows the stupendous industrial utility of cellulose and the immense value of each fact gleaned from the field of cellulose research. At present, although one third of the dried vegetable matter of the world is cellulose, it cannot be synthesized in the laboratory and very little is known about it.

One class of cellulose industries is based on its inertness and resistivity to the disintegrating action of air and moisture. First in importance comes paper, both that made from the comparatively pure cellulose of rags and that from wood pulp. As most of the cellulose in wood exists chemically encrusted with other substances, the problem has been either to manufacture the paper directly from wood, in which case it does not last, or to devise a means of extracting the pure cellulose. This has been done but the resulting cellulose is not so pure as that from cotton. Another important cellulose industry, the making of fabrics, has almost reached perfection. One interesting phase is the mercerization of cotton by the application of caustic soda. Twine and rope are also cellulose products. Out of the 110,000 species of flowering plants that exist in the world, the fiber-making possibilities of only half a dozen are used.

Cellulose also has merit as a chemically active body. Dissolved in one substance it forms vulcanized fiber or may be carbonized for incandescent light filaments. When treated in another

way an insulating material for electric wires is formed. By still another method, viscose, a very plastic form of cellulose, can be obtained. This can be moulded into various forms or made into films possessing great elasticity. The addition of nitric acid or nitroglycerin results in gun cotton, blasting gelatin, or smokeless powder. Our common celluloid comes from low cellulose nitrates dissolved in solid camphor and alcohol. One of the greatest triumphs of technological science is the production of artificial silk from either cellulose nitrate or viscose. The value of a pine tree is increased nearly 600 fold when it is spun into this silk.

The cellulose industry is developed upon an exceedingly slender knowledge of the raw material and it would be well for manufacturers and centers of technical education to give more attention to the subject. — Jane R. Condit.

Recent government publications contain the following statements: "When water falls on the soil part of it runs off the surface, and part of it runs through the surface by gravitation and comes out in the subsoil, and part of it starts and rises as soon as we get sunlight on the surface, and this part comes up in films over and through the finer spaces, and is bringing with it dissolved material from below." The water that passes through larger openings, gets very little of the soluble material, "because it is not long in contact with the soil grains. It gets some by reason of the fact that, as we know, our springs and rivers and wells are all soil solutions and carry mineral matter. Now, water rising by capillarity cannot get very concentrated because it gets saturated with the minerals, and any excess that is contained in it is thrown out, except in extreme conditions, as in the west, and then we get alkali conditions; but under ordinary humid conditions we cannot have an excess of it, and the soil solution is bringing materials from below which the plant gets, and, as a matter of fact, the most important discovery of the Bureau of Soils in recent years is that plants are feeding on material from the subsoils, far below where the roots go. If this is true, and there are many other arguments in the same line, it is absurd to make an analysis of the surface soil and say that is the

soil that the plant is feeding on." Professor C. G. Hopkins, in a lecture given at Cornell last July, refers to the above quotation and states that because of proven "uncompensated loss by leaching of the upper soil in all normal humid sections, we dare not base our definite plans for systems of permanent agriculture upon a theory that by the rise of capillary water plant food is brought from the lower subsoils sufficient to meet the needs of large crops and to maintain the fertility of the surface soil in all places and for all time."

Professor Hopkins further says: "One dollar taken from 100 dollars leaves not 100 dollars, but only 99 dollars. This is a scientific fact which no theory or hypothesis can nullify. Likewise when a crop removes 20 pounds of phosphorus from the soil it leaves that soil 20 pounds poorer in phosphorus than before the crop was grown. The rotation of crops or the application of salt or some other stimulant may liberate another 20 pounds of phosphorus from the soil and thus enable us to grow another crop the next year, and possibly this may be repeated for several or many years, but meanwhile the total supply of phosphorus in the soil is growing smaller and smaller year by year, until ultimately neither crop rotation nor soil stimulants can liberate sufficient phosphorus from the remaining meager supply to meet the needs of profitable crops. It is certainly safe teaching and safe practice to return to the soil as much or more than we remove of such plant-food elements as are contained in the soil in limited amounts when measured by the actual requirements of large crops during one lifetime."

The following extracts from President Roosevelt's recent message to Congress are of interest:

(1) "There are, of course, two kinds of natural resources. One is the kind which can only be used as part of a process of exhaustion; this is true of mines, natural oil and gas wells, and the like. The other, and of course ultimately by far the most important, includes the resources which can be improved in the process of wise use; the soil, the rivers, and the forests come under this head."

(2) "There are small sections of our own country, in the east

and in the west, in the Adirondacks, the White Mountains, and the Appalachians, and in the Rocky Mountains, where we can already see for ourselves the damage in the shape of permanent injury to the soil and the river systems which comes from reckless deforestation. It matters not whether this deforestation is due to the actual reckless cutting of timber, to the fires that inevitably follow such reckless cutting of timber or to reckless and uncontrolled grazing, especially by the great migratory bands of sheep, the unchecked wandering of which over the country means destruction to forests and disaster to the small homemakers, the settlers of limited means."

(3) "Not many centuries ago the country of northern China was one of the most fertile and beautiful spots in the entire world and was heavily forested.

"We know this not only from the old Chinese records, but from the accounts given by the traveler Marco Polo. He, for instance, mentions that in visiting the provinces of Shansi and Shensi he observed many plantations of mulberry trees. Now there is hardly a single mulberry tree in either of these provinces, and the culture of the silkworm has moved further south, to regions of atmospheric moisture. As an illustration of the complete change in the rivers, we may take Polo's statement that a certain river, the Hun Ho, was so large and deep that merchants ascended it from the sea with heavily laden boats; to-day this river is simply a broad sandy bed, with shallow, rapid currents wandering hither and thither across it, absolutely unnavigable.

"But we do not have to depend upon written records. The dry wells, and the wells with water far below the former water mark, bear testimony to the good days of the past and the evil days of the present. Wherever the native vegetation has been allowed to remain, as, for instance, here and there around a sacred temple or imperial burying ground, there are still huge trees and tangled jungle, fragments of the glorious ancient forests. The thick, matted forest growth formerly covered the mountains to their summits. All natural factors favored this dense forest growth, and as long as it was permitted to exist the plains at the foot of the mountains were among the most fertile on the globe, and the whole country was a garden.

"Not the slightest effort was made, however, to prevent the unchecked cutting of the trees or to secure reforestation. . . . The big trees disappeared centuries ago, so that now one of these is never seen save in the neighborhood of temples, where they are artificially protected; and even here it takes all the watch and care of the tree-loving priests to prevent their destruction."

NEWS ITEMS.

Professor John M. Coulter, of the University of Chicago, and his family were on the steamer Republic during the recent collision with the Florida. Professor Coulter lost the manuscript of his proposed new book on gymnosperms. He expects to resume his journey soon; he had originally planned to attend the Darwin celebrations in England.

The University of Wisconsin is to build on its campus a building suitable for the United States Forestry Service, thus enabling the Service to concentrate its western laboratories, and carry on a series of investigations on timber, lumbering, the making of wood pulp, and the utilization of present by-products. The government will in return equip the building and provide for lectures to students at the university.

A series of nine lectures on Charles Darwin and his influence on science are being given Friday afternoons, at 4 P. M., in 309 Havemeyer Hall, Columbia University. The first two on "Darwin's Life and Work" by Henry Fairfield Osborn and "Terrestrial Evolution and Paleontology" by William Berryman Scott, have been given. The others are: "Darwin's Influence on Zoölogy" by Thomas Hunt Morgan, February 26; "Darwin in Relation to Anthropology" by Franz Boas, March 5; "Darwin's Contribution to Psychology" by Edward Lee Thorndike, March 12; "Darwin's Influence on Botany" by Daniel Trembly MacDougal, March 19; "Darwinism and Modern Philosophy" by John Dewey, March 26; "Cosmic Evolution" (date subject to change) by George Ellery Hale, April 2; and "Darwinism in Relation to the Evolution of Human Institutions" by Franklin Henry Giddings, April 16.